a) $l_z = 10m \quad \varepsilon_r = 4, \quad \omega = 2\pi \cdot 10^7 \frac{1}{s}$

elektr. Länge: $\frac{l_z}{\lambda} = \frac{l_z f}{c} = \frac{l_z}{c_0}\sqrt{\varepsilon_r}\,\frac{\omega}{2\pi}$

$= \frac{10m}{3\cdot 10^8 \frac{m}{s}} \cdot 2 \cdot 10^7 \cdot \frac{1}{s} = \frac{2}{3} \not\approx 1$

b) $\vec{k} = \vec{e}_z \cdot \frac{2\pi}{\lambda}$

$\underline{\vec{E}}(\rho,\varphi,z) = \underline{\vec{E}}_1(\rho,\varphi)\, e^{-j\vec{k}\vec{e}_z z} = \underline{\vec{E}}_1(\rho,\varphi)\, e^{-j\frac{2\pi}{\lambda}z}$

c) $= \underline{\vec{E}}_1(\rho,\varphi)\, e^{-j\frac{2\pi}{c_0}\sqrt{\varepsilon_r}\frac{\omega}{2\pi}z}$

$= \underline{\vec{E}}_1(\rho,\varphi)\cdot e^{-j\,\omega\sqrt{\varepsilon_r}/c_0 \cdot z}$

d) $\Delta_{2D}\,\Phi(\rho,\varphi, z=0,t) = 0$

$\Rightarrow \frac{1}{\rho}\cdot\frac{\partial}{\partial\rho}\left(\rho\cdot\frac{\partial\Phi}{\partial\rho}\right) + \underbrace{\frac{1}{\rho^2}\frac{\partial^2\phi}{\partial\varphi^2}}_{\substack{=0 \text{ wg. TEM-Welle} \\ \text{(rotationssymmetrisch)}}}$

Ansatz $\Phi(\rho,\varphi, z=0,t) = const_1 + const_2 \ln(\rho)\; h(t)$

ist Lösung der DGL

e) $\underline{\vec{E}}_1(\rho,\varphi)$ gesucht

$\Phi(\rho,\varphi,z=0,t) = const_2 \cdot \ln(\rho)\, h(t) + const_1$

Es gilt bei $z=0$:

$\Phi(\rho=r_i,\varphi, z=0,t) - \Phi(\rho=r_a,\varphi, z=0,t) = U_0 \sin\omega t$ (*)

$Re\{\underline{\vec{E}}_1(\rho,\varphi)\cdot e^{j\omega t}\} = -\nabla\Phi(\rho,\varphi,z=0,t)$

(*) $const_2 \cdot \ln\left(\frac{r_i}{r_a}\right) h(t) = U_0 \sin\omega t$

$\Rightarrow const_2 = \frac{U_0}{\ln\frac{r_i}{r_a}}$ und $h(t) = \sin\omega t$

$\Rightarrow \Phi = -\frac{U_0}{\ln\frac{r_a}{r_i}} \ln(\rho) \sin\omega t$

$Re\{\underline{\vec{E}}_1(\rho,\varphi)\cdot e^{j\omega t}\} = -\frac{\partial\Phi}{\partial\rho}\vec{e}_\rho = \frac{U_0}{\ln\frac{r_a}{r_i}}\cdot\frac{1}{\rho}\vec{e}_\rho \cdot \sin\omega t$

$\Rightarrow \underline{\vec{E}}_1(\rho,\varphi) = -j\frac{U_0}{\ln(r_a/r_i)}\frac{1}{\rho}\vec{e}_\rho \quad \Rightarrow \boxed{\underline{\vec{E}} = \underline{\vec{E}}_1 e^{-j\frac{\omega}{c_0}\sqrt{\varepsilon_r}z}}$

f) $l_z = 1m \Rightarrow \omega = 2\pi \cdot 10^5 \cdot \frac{1}{s}$

$$\frac{l_z}{\lambda} = \frac{l_z}{c_0}\sqrt{\varepsilon_r}\,\frac{\omega}{2\pi} = \frac{1m}{3\cdot 10^8 \frac{m}{s}} \cdot 2 \cdot 10^5 \cdot \frac{1}{s} = \frac{2}{3}\cdot 10^{-3} \ll 1$$

$$\vec{E}(\rho, \varphi, z, t) = Re\{\vec{E}\cdot e^{j\omega t}\}$$

$$= Re\{-j\frac{U_0}{\ln\frac{r_a}{r_i}} \cdot \frac{1}{\rho}\cdot \vec{e}_\rho\, e^{-jkz+j\omega t}\}$$

$$= \frac{U_0}{\ln\frac{r_a}{r_i}} \cdot \frac{1}{\rho}\,\vec{e}_\rho\, Re\{-j(\cos(\omega t - kz) + j\sin(\omega t - kz))\}$$

$$= \frac{U_0}{\ln\frac{r_a}{r_i}} \cdot \frac{1}{\rho}\,\vec{e}_\rho \sin(\omega t - \underbrace{kz}_{\ll 1 \text{ da } \frac{l_z}{\lambda} \ll 1})$$

$$\approx \frac{U_0}{\ln\frac{r_a}{r_i}} \cdot \frac{1}{\rho}\,\vec{e}_\rho \sin\omega t$$

A2 HÜ6

a) $E(z) = \frac{U_0}{h} \exp(-jkz)\, \vec{e}_x$

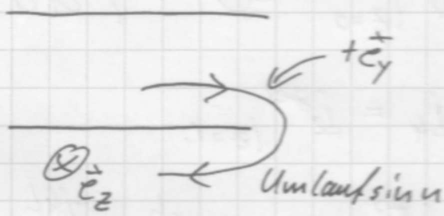
$k = \omega\sqrt{\varepsilon\mu}$; U_0 ~~reelle~~ Konstante

$$\underline{\vec{H}}(z) = \frac{1}{Z_F}(\vec{n} \times \vec{E}) = \sqrt{\frac{\varepsilon}{\mu}}(\vec{n} \times \vec{E}) = \sqrt{\frac{\varepsilon}{\mu}}(\vec{e}_z \times \vec{e}_x)\frac{U_0}{h} e^{-jkz}$$

$$= \sqrt{\frac{\varepsilon}{\mu}}\, \vec{e}_y \cdot \frac{U_0}{h} \cdot e^{-jkz}$$

b) $u_1^h(z) = \int_{P_1}^{P_2} E(z)\, d\vec{r}$

$u_1^h(z) = U_0\, e^{-jkz}$



$\underline{i}_1^h(z) = ?$

$\mathrm{rot}\,\vec{H} = \vec{J} + \dot{\vec{D}} \qquad \oint \vec{H}\, d\vec{s} = \underline{i} \quad \rightarrow \quad b \cdot H(z) = \underline{i}$

$\Rightarrow i_1^h(z) = b\sqrt{\frac{\varepsilon}{\mu}}\, \frac{U_0}{h}\, e^{-jkz}$

$$Z_L = \frac{u_1^h}{i_1^h} = \frac{h}{b}\sqrt{\frac{\varepsilon}{\mu}}^{-1} = Z_F\, \frac{h}{b}$$

c) $\underline{z = 0}$ $\quad \underline{U}_1^h + \underline{U}_1^r = \underline{U}_2^h + \underline{U}_2^r \quad (\text{mit } u_y^x = U_y^x \cdot e^{\pm jkz})$ (1)

$-\underline{i}_r^1 + \underline{i}_1^h = \underline{i}_2^h - \underline{i}_2^r + \underline{i}_R = \underline{i}_2^h - \underline{i}_2^r + \frac{\underline{U}_2^h + \underline{U}_2^r}{R}$ (2)

$\underline{z = L:}$ $\quad \underline{U}_2^h \cdot e^{-jkL} = -\underline{U}_2^r\, e^{+jkL}$ (3)

d) $l_{min} = \frac{\lambda}{4}$ und $\underline{U}_1^r = 0$

$\Rightarrow \underline{U}_1^h = \underline{U}_2^h + \underline{U}_2^r$ (1)

$\frac{U_1^h}{Z_L} = \frac{U_2^h}{Z_L} - \frac{U_2^r}{Z_L} + \frac{U_2^h + U_2^r}{R}$ (2)

$U_2^h(-j) = -U_2^r \cdot j \Rightarrow \underline{U}_2^h = +\underline{U}_2^r$ (3)

$e^{jk\frac{\lambda}{4}} = e^{-j\frac{2\pi}{4}} =$

$\cos\frac{\pi}{2} - j\sin(\frac{\pi}{2}) = -j$

$e^{jk\lambda/4} = j$

$\underline{U}_1^h = \underline{U}_2^h + \underline{U}_2^r \Rightarrow \underline{U}_1^h = U_0 = 2 \cdot \underline{U}_2^h$ (1) + (3)

(2) $\frac{\underline{U}_1^h}{Z_L} = \frac{U_0}{Z_L} = \frac{\underline{U}_2^h}{Z_L} - \frac{\underline{U}_2^r}{Z_L} + \frac{\underline{U}_2^h - \underline{U}_2^r}{R}$

$\Rightarrow \frac{U_0}{Z_L} = \frac{U_2^h}{Z_L} - \frac{U_2^h}{Z_L} + \frac{U_2^h + U_2^h}{R} \quad \Rightarrow U_0 = \frac{2U_2^h}{R} Z_L$

mit (1) folgt: $\boxed{R = Z_L}$

$$\underline{H}_{x1} = \frac{\beta^2}{j\omega\mu_0}\left(\underline{B}_1 \sin(\underline{k}_{x1}\cdot x)\right) e^{-j\beta z} \qquad \left(k_1^2 + \frac{\partial^2}{\partial x^2}\right)\underline{f}_1 = \beta^2 \underline{f}_1$$

$$H_{x1} = \frac{1}{j\omega\mu_0}\frac{\partial^2 f_1}{\partial x \partial y} \equiv 0 \qquad \text{da} \quad f_1(x,z)$$

$$\underline{H}_{z1} = \frac{1}{j\omega\mu_0}\frac{\partial^2 f_1}{\partial x \partial y} = -\frac{\beta}{\omega\mu_0}\frac{\partial f_1}{\partial x} = -\frac{\beta \underline{k}_{x1}}{\omega\mu_0}\left(\underline{B}_1 \cos(\underline{k}_{x1} x)\right) e^{-j\beta z}$$

Gebiet 2 $\quad \underline{E}_{x2} \equiv 0 \qquad \underline{E}_{z2} \equiv 0 \qquad H_{y2} \equiv 0$

$$\underline{E}_{y2} = j\beta \; \underline{B}_2 \sin(\underline{k}_{x2}(2h-x)) \, e^{-j\beta z}$$

$$\underline{H}_{x2} = \frac{\beta^2}{j\omega\mu_0} \underline{B}_2 \sin(\underline{k}_{x2}(2h-x)) \, e^{-j\beta z}$$

$$\underline{H}_{z2} = -\frac{\beta \underline{k}_{x2}}{\omega\mu_0}\left(-\underline{B}_2 \cos(\underline{k}_{x2}(2h-x)\right) e^{-j\beta z}$$

c) Stetigkeit bei $x=h$: $\vec{\underline{E}}_{tan1} = \vec{\underline{E}}_{tan2}$ und $\vec{\underline{H}}_{tan1} = \vec{\underline{H}}_{tan2}$

$\underline{E}_{y1}(x=h) = \underline{E}_{y2}(x=h) \Rightarrow \underline{B}_1 \sin(\underline{k}_{x1} h) = \underline{B}_2 \sin(\underline{k}_{x2} h)$

$E_{z1}(x=h) = E_{z2}(x=h) \equiv 0$ ✓ $\qquad \underline{H}_{y1}(x=h) = \underline{H}_{y2}(x=0) \equiv 0$ ✓

$\underline{H}_{z1}(x=h) = \underline{H}_{z2}(x=h) \Rightarrow -\underline{k}_{x1}\underline{B}_1 \cos(\underline{k}_{x1} h) = \underline{k}_{x2}\underline{B}_2 \cos(\underline{k}_{x2} h)$

Charakteristische Gl. $\quad$ oder mit $\tan(\cdot)$ und Kehrwert

$\underline{k}_{x1} \cot(\underline{k}_{x1} h) = -\underline{k}_{x2} \cot(\underline{k}_{x2} h) \qquad$ mit $\underline{k}_{x_i}^2 = k_i^2 - \beta^2$

d) Fall $\varepsilon_1 = \varepsilon_2 \qquad k_1 = k_2 \qquad k_{x1} = k_{x2} \neq 0$

Charakt. Gl:

$k_{x1} \cot(k_{x1} h) = -k_{x2} \cot(k_{x2} h)$

da $k_{x1} = k_{x2}$: $\qquad = -k_{x1} \cot(k_{x1} h)$

$\Rightarrow k_{x1} \cot(k_{x1} h) = 0 \Rightarrow \cot(k_{x1} h) = 0 \qquad$ da $k_{x1} \neq 0$

$\Rightarrow k_{x1} = \pm\frac{\pi}{2h};\ \pm\frac{3\pi}{2h};\ \pm\frac{5\pi}{2h};\ \ldots$

andere char. Gl: $k_{x2} \tan(k_{x1} h) = -k_{x1} \tan(k_{x2} h)$

$\Rightarrow \tan(k_{x1}\cdot h) = 0$ (analog wie oben) $\Rightarrow k_{x1} = 0;\ \pm\frac{\pi}{h};\ \pm\frac{2\pi}{h};\ \pm\frac{3\pi}{h}$

Für TEx Grundwelle $\quad$ TEx10 $\quad k_{x1} = k_{x2} = \frac{\pi}{2h}$

Grenzfrequ: ω_c mit $\beta(\omega_c) = 0$: $k_{x1}^2 = k_1^2 - \beta^2 = k_1^2 = \omega_c^2 \varepsilon_1 \mu_0 \Rightarrow \omega_c = \frac{\pi}{2h}\cdot\frac{1}{\sqrt{\varepsilon_1 \mu_0}}$

A5

a) TE_x Hybridwelle : $(\underline{E}_x = 0)$

$\vec{\underline{F}}_i = f_i(x,z)\vec{e}_x = \tilde{\underline{f}}_i(x)\, e^{-j\beta z}\vec{e}_x \qquad i = 1,2$

$\vec{\underline{G}}_i = 0 \qquad \Rightarrow E_x = 0$

mit $\beta^2 = \omega^2 \varepsilon_{eff}(\omega)\mu_0, \quad k_i^2 = \omega^2 \varepsilon_i \mu_0$

Helmholtz Gl.: mit $k_{x_i}^2 = k_i^2 - \beta^2$

$\left(\frac{d^2}{dx^2} - \beta^2 + k_i^2\right)\tilde{\underline{f}}_i(x) = 0 \Leftrightarrow \left(\frac{d^2}{dx^2} + \underline{k}_{x_i}^2\right)\tilde{\underline{f}}_i(x) = 0$

$\tilde{\underline{f}}_1(x) = B_1 \sin(\underline{k}_{x1} x)$

$\tilde{\underline{f}}_2(x) = B_2 \sin(k_{x2}(2h - x))$

b) Gebiet 1: Randbed.: $\vec{\underline{E}}_{tan1} = 0$ und $\underline{H}_{n1} = 0$

$E_{x1}(y=0) = 0$ ✓ $E_{x1}(y=b) = 0$ ✓

$E_{z1}(y=0) = 0$ ✓ $E_{z1}(y=b) = 0$ ✓

$E_{y1}(y=0) = 0$ ✓ $E_{y1}(y=b) = 0$ ✓

$E_{y1}(x=0) = 0 \Rightarrow \boxed{A_1 = 0}$

$E_{z1}(x=0) = 0$ ✓

$E_{x1}(x=0) = 0 \Rightarrow A_1 = 0$ ✓

Gebiet 2: Randbed: $\vec{\underline{E}}_{tan2} = 0$ und $\underline{H}_{n2} = 0$

$\Rightarrow \underline{E}_{x2}(y=0) = 0$ ✓ $\underline{E}_{x2}(y=b) = 0$ ✓

$\underline{E}_{z2}(y=0) = 0$ ✓ $\underline{E}_{z2}(y=b) = 0$ ✓

$\underline{E}_{y2}(y=0) = 0$ ✓ $\underline{H}_{y2}(y=b) = 0$ ✓

$\underline{E}_{y2}(x=2h) = 0 \Rightarrow \boxed{A_2 = 0}$

$\underline{E}_{z2}(x=2h) = 0$ ✓

$\underline{E}_{x2}(x=2h) = 0 \Rightarrow \underline{A}_2 = 0$ ✓

Gebiet 1: $\underline{E}_{x1} = 0$ da $g_1 = 0$

$\underline{E}_{y1} = -\frac{\partial f_1}{\partial z} = j\beta \underline{f}_1$

$\underline{E}_{y1} = j\beta\, \underline{B}_1 \sin(\underline{k}_{x1} x)\, e^{-j\beta z}$

$\underline{E}_{z1} = \frac{\partial f_1}{\partial y} = 0$ da $f_1(x,z)$

$$\underline{H}_{x1} = \frac{\beta^2}{j\omega\mu_0}\left(\underline{B}_1 \sin(\underline{k}_{x1}\cdot x)\right) e^{-j\beta z} \qquad \left(k_1^2 + \frac{\partial^2}{\partial x^2}\right)\underline{f}_1 = \beta^2 \underline{f}_1$$

$$H_{x1} = \frac{1}{j\omega\mu_0} \frac{\partial^2 f_1}{\partial x \partial y} \equiv 0 \qquad \text{da} \quad f_1(x,z)$$

$$\underline{H}_{z1} = \frac{1}{j\omega\mu_0} \frac{\partial^2 f_1}{\partial x \partial y} = -\frac{\beta}{\omega\mu_0}\frac{\partial f_1}{\partial x} = -\frac{\beta \underline{k}_{x1}}{\omega\mu_0}\left(\underline{B}_1 \cos(\underline{k}_{x1} x)\right) e^{-j\beta z}$$

<u>Gebiet 2</u> $\underline{E}_{x2} \equiv 0 \qquad \underline{E}_{z2} \equiv 0 \qquad H_{y2} \equiv 0$

$$\underline{E}_{y2} = j\beta \;\; \underline{B}_2 \sin(\underline{k}_{x2}(2h-x))\, e^{-j\beta z}$$

$$\underline{H}_{x2} = \frac{\beta^2}{j\omega\mu_0}\, \underline{B}_2 \sin(\underline{k}_{x2}(2h-x))\, e^{-j\beta z}$$

$$\underline{H}_{z2} = -\frac{\beta \underline{k}_{x2}}{\omega\mu_0}\left(-\underline{B}_2 \cos(\underline{k}_{x2}(2h-x)\right) e^{-j\beta z}$$

c) Stetigkeit bei $x=h$: $\vec{\underline{E}}_{tan1} = \vec{\underline{E}}_{tan2}$ und $\vec{\underline{H}}_{tan1} = \vec{\underline{H}}_{tan2}$

$\underline{E}_{y1}(x=h) = \underline{E}_{y2}(x=h) \Rightarrow \underline{B}_1 \sin(\underline{k}_{x1} h) = \underline{B}_2 \sin(\underline{k}_{x2} h)$

$E_{z1}(x=h) = E_{z2}(x=h) \equiv 0$ ✓ $\qquad \underline{H}_{y1}(x=h) = \underline{H}_{y2}(x=0) \equiv 0$ ✓

$\underline{H}_{z1}(x=h) = \underline{H}_{z2}(x=h) \Rightarrow -\underline{k}_{x1}\underline{B}_1 \cos(\underline{k}_{x1} h) = \underline{k}_{x2}\underline{B}_2 \cos(\underline{k}_{x2} h)$

<u>Charakteristische Gl.</u> oder mit tan(·) und Kehrwert

$\underline{k}_{x1} \cot(\underline{k}_{x1} h) = -\underline{k}_{x2} \cot(\underline{k}_{x2} h) \qquad$ mit $\underline{k}_{x_i}^2 = k_i^2 - \beta^2$

d) Fall $\varepsilon_1 = \varepsilon_2 \qquad k_1 = k_2 \qquad k_{x1} = k_{x2} \neq 0$

Charakt. Gl:

$k_{x1} \cot(k_{x1} h) = -k_{x2} \cot(k_{x2} h)$

da $k_{x1} = k_{x2}$: $\qquad = -k_{x1} \cot(k_{x1} h)$

$\Rightarrow k_{x1} \cot(k_{x1} h) = 0 \Rightarrow \cot(k_{x1} h) = 0 \qquad$ da $k_{x1} \neq 0$

$\Rightarrow k_{x1} = \pm\frac{\pi}{2h};\ \pm\frac{3\pi}{2h};\ \pm\frac{5\pi}{2h};\ \ldots$

andere char. Gl: $k_{x2} \tan(k_{x1} h) = -k_{x1} \tan(k_{x2} h)$

$\Rightarrow \tan(k_{x1}\cdot h) = 0$ (analog wie oben) $\Rightarrow k_{x1} = 0;\ \pm\frac{\pi}{h};\ \pm\frac{2\pi}{h};\ \pm\frac{3\pi}{h}$

Für TE_x Grundwelle $TE_{x10} \qquad k_{x1} = k_{x2} = \frac{\pi}{2h}$

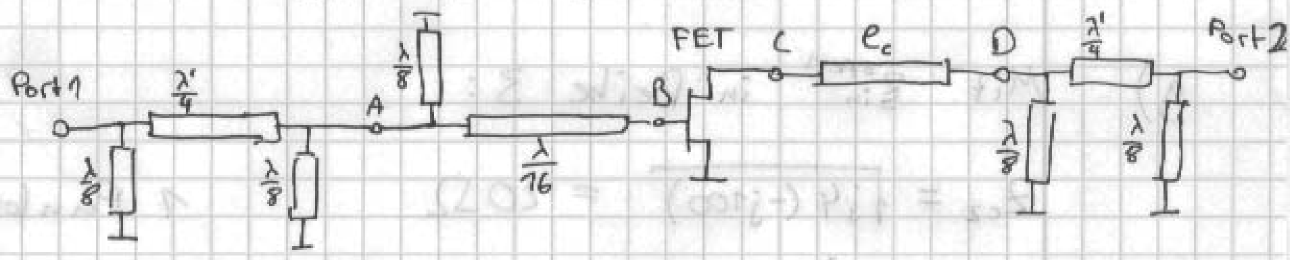
Grenzfrequ: ω_c mit $\beta(\omega_c) = 0$: $k_{x1}^2 = k_1^2 - \beta^2 = k_1^2 = \omega_c^2 \varepsilon_1 \mu_0$
$\Rightarrow \omega_c = \frac{\pi}{2h} \cdot \frac{1}{\sqrt{\varepsilon_1 \mu_0}}$

Klausur H08

Aufgabe 4

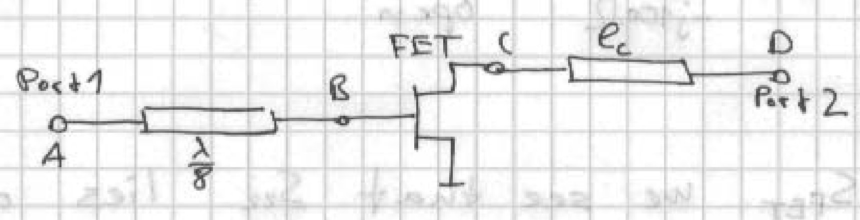
a) Port 1: $\underline{U}_1 = \frac{U_g}{2} + \frac{U_g}{2}$

Port 4: $\underline{U}_4 = \frac{U_g}{2} - \frac{U_g}{2}$



Odd-mode bei f_0

b) $\frac{\lambda}{8} \rightarrow \frac{\lambda}{4}$ $\quad K \xrightarrow{\frac{\lambda}{4}} LL \quad$ $\frac{\lambda'}{4} \rightarrow \frac{\lambda'}{2}$



Odd-mode bei $2f_0$

c) $$\underline{Z}_1 = \frac{\underline{U}_1}{\underline{I}_1} = \frac{U_2 \cos(\beta l) + j Z_0 \sin(\beta l)(-\underline{I}_2)}{\underline{U}_2 j Y_0 \sin(\beta l) + \cos(\beta l)(-\underline{I}_2)}$$

$\underline{Z}_{in}^{open} = \underline{Z}_1(\underline{I}_2 = 0) = -j Z_0 \cot(\beta l)$ 2 Punkte

$\underline{Z}_{in}^{short} = \underline{Z}_1(\underline{U}_2 = 0) = j Z_0 \tan(\beta l)$ 2 Punkte

d) $Z_0 = \sqrt{\underline{Z}_{in}^{open} \underline{Z}_{in}^{short}}$ 2 Punkte

$Z_{c1} = \sqrt{(-j100)(j25)} = 50\,\Omega$ 1 Punkt

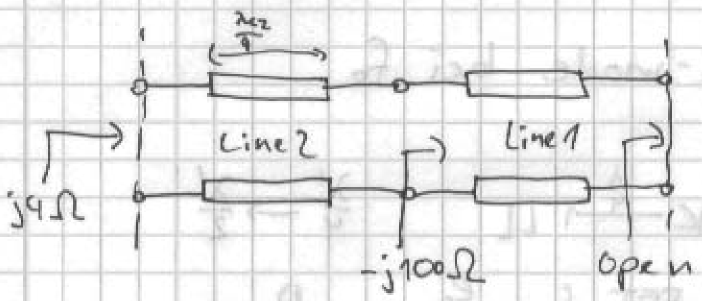
e) $\Theta = \arctan\sqrt{-\frac{Z_{in}^{short}}{Z_{in}^{open}}}$ 2 Punkte

$\Theta_{c1} = \arctan\sqrt{-\frac{j25}{-j100}} = \arctan\left(\frac{1}{2}\right) = 26{,}6^\circ$ 1 Punkt

f) $l_{c2} = \frac{\lambda_{c2}}{4}$ oder $\Theta_{c2} = 90^\circ$ 1 Punkt

g) Mit Z_{in}^{open} in Reihe 3:

$Z_{c2} = \sqrt{j4(-j100)} = 20\,\Omega$ 1 Punkt



h)
- From S_{FET} we see that S_{22} lies on the real axis of reflection coefficient plane. In addition FET is unilateral, therefore output impedance of transistor is real.
- To transform $Z_0 = 50\,\Omega$ into the real impedance Z_{out}^{FET} we need a $\frac{\lambda}{4}$-transformator, so that only Line 2 can be used.
- Impedance seen by FET:

$$Z_{seen}^{FET} = \frac{(20\,\Omega)^2}{50\,\Omega} = 8\,\Omega$$

EMF - H08

Aufgabe 5:

a) Das Bauteil ist eine (Schottky-) Diode. Die Eigenschaft: Nichtlinear

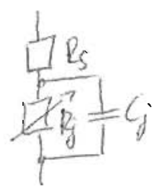
b) ESB 0. Ordnung

AP1: R_j AP2: C_j

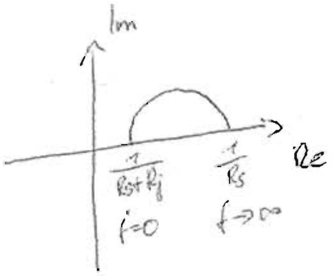
c) $R_j = \frac{1}{0,08S} = 12,5\Omega$ und $|X_j| = \frac{1}{0,005S} \Rightarrow C_j = \frac{Y_j}{\omega} \left[= \frac{5\cdot10^{-3}}{10\cdot10^{9}} \right]$

$= 0,5pF$

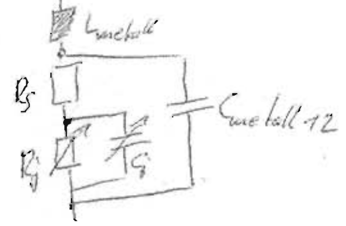
d) intrinsisches Bauteil



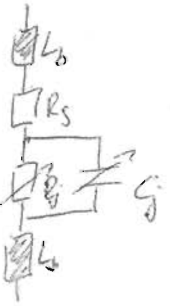
e)



f) Kapazität zwischen Metall 1 und Metall 2 (parallel zu intrinsics)
Induktivität der Metall 1 Leitung



g) Bonddraht ⇒ Spule

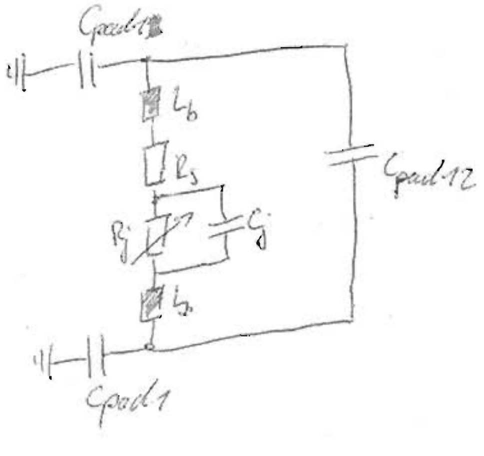


$\omega = \frac{1}{\sqrt{LC}} \Rightarrow L = \frac{1}{\omega^2 C}$

$L = 1,25nH = 2\cdot L_b$

$R_s = \frac{1}{0,125}S = 8\Omega$

h) Padkapazitäten



EMF - H08

Aufgabe 6:

a) ~~Lösung 1. Unterpunkt:~~

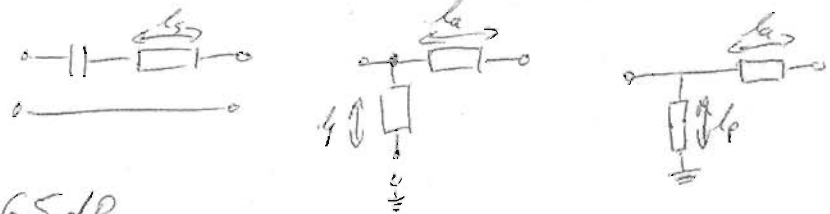
Zwei Antworten akzeptiert:

- 1. Transistor dessen S_{22}^* den geringsten Abstand zu Γ_L hat ermöglicht das breitbandigste Anpassungsnetzwerk mit geringster Güte
- 1. Transistor dessen S_{22}^* auf Kreisen konst. Güte am nächsten zu $\Gamma = 0$ liegt, hat geringste Güte

b) Mit dem vorgegebenen Anp.-netzw. ist nur ~~eine~~ mit Transistor 3 Leistungsanpassung möglich

c) $y_p = -j0{,}373$, $l_a = 0{,}041\lambda$

d) Kondensator in Serie oder Stichleitung



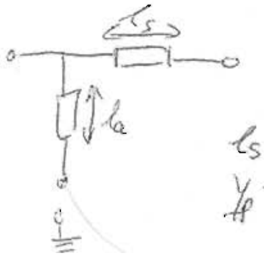
e) $F_1 = 3{,}65\,dB$

$G_{q1} = 0\,dB$

f) aus Smith-Chart: $Re\{\Gamma_{1,min}\} = -0{,}364$, $Im\{\Gamma_{1,min}\} = 0{,}108$

$$y_{1,min} = \frac{1-\Gamma_{1,min}}{1+\Gamma_{1,min}} = \frac{1 - Re\{\Gamma_{1,min}\} - j\,Im\{\Gamma_{1,min}\}}{1 + Re\{\dots\} + j\,Im\{\dots\}}$$

g)



$l_s = 0{,}140\lambda$

$y_p = j1{,}11$, $l_p = 1{,}33\lambda$

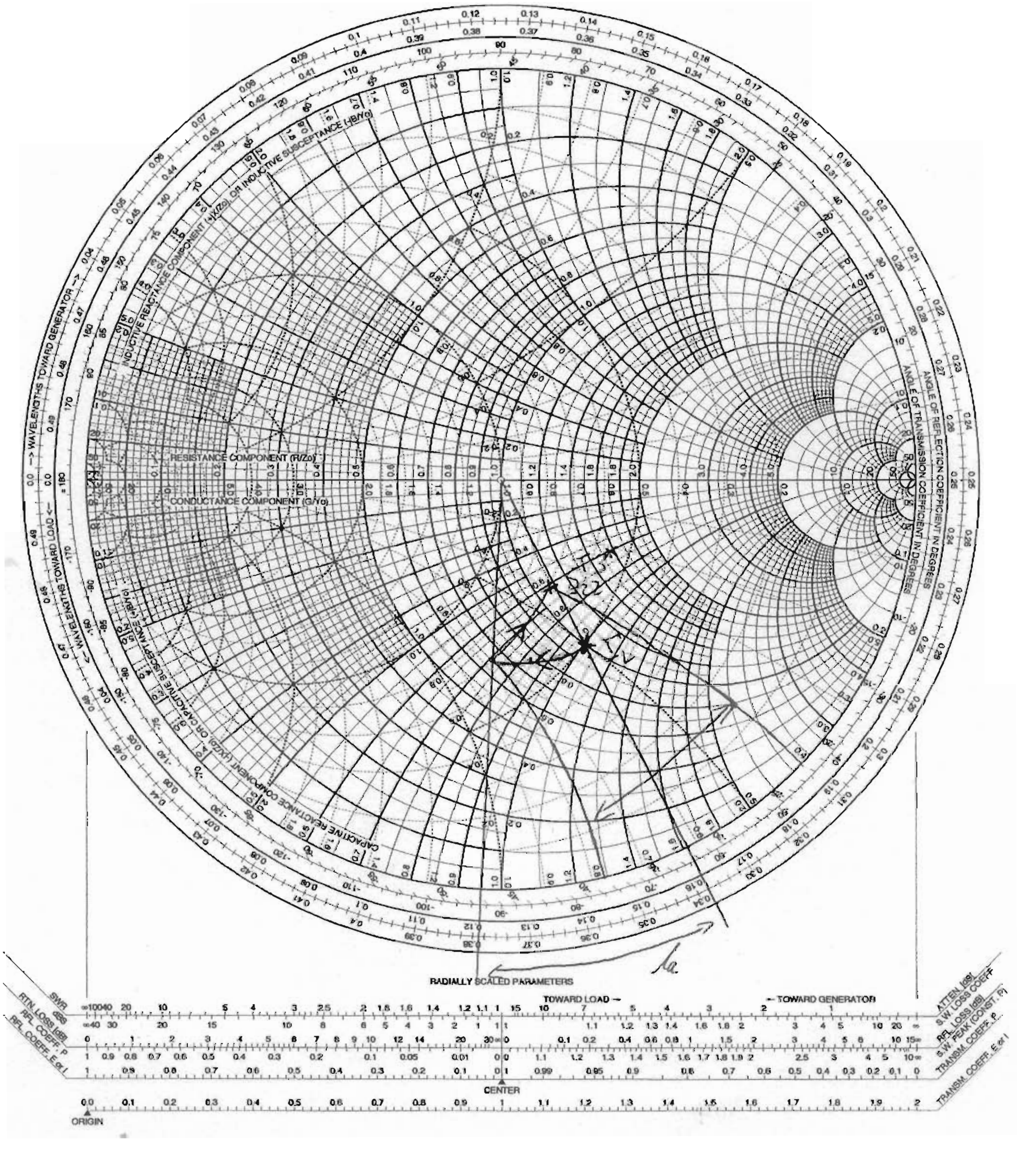
Institut für Theoretische Elektrotechnik
Rhein.-Westfäl. Techn. Hochschule Aachen
Prof. Dr.-Ing. Rolf H. Jansen
Prof. Dr.-Ing. Andrei Vescan

Herbst 2008

KLAUSURAUFGABEN "ELEKTROMAGNETISCHE FELDER 2 (EE)"

Hilfsblatt 1 zu Aufgabe 6, Unterpunkt a) und c)

Name: ______________________ **Matr.Nr.:** ____________



Institut für Theoretische Elektrotechnik
Rhein.-Westfäl. Techn. Hochschule Aachen
Prof. Dr. Ing. Rolf H. Jansen
Prof. Dr. Ing. Andrei Vescan

Herbst 2008

KLAUSURAUFGABEN "ELEKTROMAGNETISCHE FELDER 2 (EE)"

Hilfsblatt 3 zu Aufgabe 6, Unterpunkt g)

Name: ______________ **Matr.Nr.:** ________